[0015] FIG. 6A graphically illustrates a first pairing of pairs of sensors of FIG. 5 for measuring current in accordance with certain embodiments.

[0016] FIG. 6B graphically illustrates a second pairing of pairs sensors of FIG. 5 for measuring current in accordance with certain embodiments.

[0017] FIG. 6C graphically illustrates a third pairing of pairs of sensors of FIG. 5 for measuring current in accordance with certain embodiments.

[0018] FIG. 7A illustrates graphically a measurement zone for measuring the current in a wire in accordance with certain embodiments.

[0019] FIG. 7B illustrates graphically the impact of interference caused by stray fields around the measurement zone of FIG. 7A in accordance with certain embodiments.

[0020] FIG. 8 presents a flowchart of an example sensor placement determination process in accordance with certain embodiments.

[0021] FIG. 9 presents a flowchart of an example current measurement process in accordance with certain embodiments.

DETAILED DESCRIPTION

[0022] The following detailed description of certain embodiments presents various descriptions of specific embodiments. However, the innovations described herein can be embodied in a multitude of different ways, for example, as defined and covered by the claims. In this description, reference is made to the drawings where like reference numerals can indicate identical or functionally similar elements. It will be understood that elements illustrated in the figures are not necessarily drawn to scale. Moreover, it will be understood that certain embodiments can include more elements than illustrated in a drawing and/or a subset of the elements illustrated in a drawing. Further, some embodiments can incorporate any suitable combination of features from two or more drawings.

[0023] A current carrying wire generates a magnetic field in the orthogonal plane to the direction of current flow. A measurement of the magnetic field can be used to infer the magnitude of the current flowing in the wire. Hall Effect sensors can be used to measure magnetic fields using the Lorentz effect. Anisotropic magnetoresistive (AMR) sensors can measure the magnetic field based on the change in resistivity that is proportional to the perpendicular magnetic field. By using magnetic sensors, such as Hall Effect sensors and/or AMR sensors, certain challenges related to measuring current through a wire can be overcome according to aspects of this disclosure. For instance, embodiments described herein can overcome challenges related to the magnetic field interference from nearby current carrying wires. As another example, embodiments described herein can overcome challenges related to a location of the current carrying wire not being fixed. Since magnetic field strength should drop off inversely with distance from the current carrying wire, the distance from the wire can have a significant impact on inferring the current flowing through the wire using magnetic sensors. Furthermore, using certain magnetic sensors, such as Hall Effect and/or AMR sensors, apparatus disclosed herein can generate outputs that can be used to accurately make both alternating current (AC) and direct current (DC) measurements.

[0024] To obtain an accurate reading of the current in a wire, certain applications rely on the wire being positioned at a certain point between the sensors of a current measuring device. Some current measuring systems can only measure the current from a wire at a particular point between the sensors of the current measuring device. If the wire is not located within the region, the measurement of the current may be inaccurate or not possible. FIG. 1A graphically illustrates a measurement zone for measuring the current in a wire for some current measurement systems. The regions 104 of the graph 102 represent the location of sensors within the current measuring device. The lighter region 106 in the graph 102 represents a region of relatively accurate measurement of the current in a wire. The scale is in millimeters with each division on the scale representing 2.5 mm. Thus, the measurement zone in FIG. 1A is approximately 1 cm in the horizontal direction by about 4 cm in the vertical direction. As can be seen from the graph 102, movement of the wire within the x-coordinate space results in a decrease in the accuracy of the current measurement by the current measurement device. Thus, the wire must be positioned at the center of the x-coordinate space of a target measurement zone to obtain an accurate current measurement. However, it may not be possible or practicable to center the wire because, for example, of the position of the wire with respect to other components of a device or the location of the wire with respect to an installation site for a device that includes the wire.

[0025] Not only can it be challenging to position a current measurement device with respect to a wire to obtain an accurate measurement of the current flowing through a wire, but it can be difficult to differentiate the signal in the wire from stray fields. These stray fields may be caused by neighboring wires or interference from other signals relatively near the wire being measured. FIG. 1B graphically illustrates the region of accuracy in the target region. Stray field interference can impact the accuracy of measurements outside of the target region. The region 122 in the center of graph 120 illustrates a measurement zone of the wire with a high accuracy. The regions 124 to either side of the region 122 represent levels of significant performance degradation due to stray field interference. As can be seen from the graph 120, movement of the wire within the x-coordinate space results in a degradation of performance of the current measurement device due to, for example, stray field interference.

[0026] Some current measuring devices attempt to address the problem of positioning the wire with respect to the sensors of the current measuring device to obtain maximum accuracy while reducing stray field interference by deterministically locating the wire. The wire may be deterministically located by shaping an opening of the current measuring device. For example, some current measuring devices shape the opening of the current measuring device to force the wire to remain at an optimal measurement point. For instance, the opening may be formed by two prongs that create a 'V' shape forcing the wire into the bottom of the 'V' shaped opening. However, this solution may not be optimal in some cases in which the position of the wire with respect to other physical components prevents the wire from being directed into the desired portion of the 'V' shaped opening for optimal measurement. For example, if two wires are positioned close together, it may not be possible to align a wire with respect to the opening of the current measuring device without causing damage to the other wire. And if because of its proximity the second wire enters the mea-